WHAT IS CLAIMED IS:

1. A method of forming amorphous chalcogenide nanowires comprising cooling a chalcogenide vapor such that substantially amorphous nanowires of the chalcogenide are grown on a preselected portion of a substrate.

2. The method of claim 1 wherein the chalcogenide nanowires include at least about 5 mole% As.

3. The method of claim 2 wherein the chalcogenide nanowires include at least about 95% As and chalcogen wherein the molar ratio of As to chalcogen is between about 1:19 and 3:4.

4. The method of claim 3 wherein the chalcogen includes S.

5. The method of claim 3 wherein the chalcogenide nanowires further includes up to about 5 mole% dopant wherein the dopant is one or more of Ga, Ge, Sn, Sb, Ag, Cu, and the rare earth elements.

6. The method of claim 1 further comprising providing the chalcogenide vapor by vaporizing bulk chalcogenide glass at a temperature within about 100°C of the glass transition temperature of the chalcogenide glass.

7. The method of claim 6 further comprising conveying the chalcogenide vapor from a first vaporization location to a second nanowire growth location wherein the temperature difference between the first and second locations is at least about 100°C.

8. The method of claim 7 wherein a chalcogenide source at the first vaporization location is at a first temperature greater than about 250°C and the preselected portion of the substrate at the second nanowire growth location is at a second temperature less than about 150°C.

9. The method of claim 8 wherein the pressure at the first location is substantially less than atmospheric pressure and is substantially equal to the pressure at the second location during growth of the chalcogenide nanowires.

10. The method of claim 9 wherein a bulk solid chalcogenide glass is at the first vaporization location and the first and second locations are in fluid communication during growth of the chalcogenide glass nanowires such that the bulk

solid chalcogenide glass substantially continuously sublimes to provide the chalcogenide glass in vapor phase.

11. The method of claim 1 wherein the preselected portion of the substrate is at least about 200 °C cooler than the chalcogenide vapor during growth of the chalcogenide nanowires.

12. A method comprising

providing a chalcogenide vapor by substantially continuously subliming bulk chalcogenide; and

growing chalcogenide nanostructures by depositing the chalcogenide vapor onto a preselected portion of a substrate.

13. The method of claim 12 further comprising substantially continuously subliming the bulk chalcogenide glass during the depositing.

14. The method of claim 12 wherein the chalcogenide nanostructures include at least about 5 mole% As.

15. The method of claim 12 wherein the nanostructures are nanowires having a thickness less than about 100 nm and an aspect ratio greater than 10.

16. The method of claim 12 wherein the preselected portion of the substrate is substantially amorphous.

17. The method of claim 1 wherein the preselected portion of the substrate is at least about 100 °C cooler than the chalcogenide vapor.

18. A method comprising:

providing a chalcogenide vapor comprising As and chalcogen in a molar ratio of X, wherein X is between about 1:19 and about 3:4

growing substantially amorphous chalcogenide nanowires on a preselected portion of a substrate exposed to the chalcogenide vapor wherein the chalcogenide nanowires have a molar ratio of As to chalcogen within about 10% of X.

19. The method of claim 18 further comprising vaporizing bulk chalcogenide glass at a temperature not more than 100°C above the glass transition temperature of the chalcogenide glass to provide the chalcogenide vapor.

20. The method of claim 18 wherein the chalcogenide nanowires are grown on a biocompatible surface of an implant.

21. The method of claim 18 wherein the chalcogenide nanowires are grown on an optical fiber.

22. The method of claim 21 wherein the optical fiber is substantially transparent to infrared light.

23. A device comprising substantially amorphous chalcogenide nanowires formed on a substrate wherein the nanowires contain As at a molar ratio of As to chalcogen between about 1:19 and about 3:4

24. The device of claim 23 wherein the nanowires include at least about 5 mole % Se.

25. The device of claim 23 wherein the nanowires include at least about 5 mole % S.

26. The device of claim 23 wherein the substrate is an implant.

27. The device of claim 23 wherein the substrate is an optical fiber.

28. The device of claim 23 wherein the substrate is substantially amorphous.

29. The device of claim 23 formed by depositing a sublimed chalcogenide vapor onto a preselected portion of the substrate.

30. A device comprising a substantially amorphous chalcogenide structure having at least one dimension less than 100μm formed by subliming bulk chalcogenide to provide a chalcogenide vapor and depositing the chalcogenide vapor onto a preselected portion of a substrate to form the structure.

31. The device of claim 30 wherein the structure is a nanowire.

32. The device of claim 30 wherein the structure is a micro-island.

33. The device of claim 30 wherein the micro-island is a substantially uniformly shaped disc such that it is capable of functioning as a wispering gallery.

34. The device of claim 30 wherein the chalcogenide glass nanostructure includes at least about 5 mole % As.

35. The device of claim 30 wherein the nanostructure is formed by cooling the chalcogenide vapor at least about 100°C.

36. The device of claim 30 wherein the chalcogenide nanostructure includes up to 43 mole% As, up to 57 mole% of one or more of S, Se, Te, and up to 10 mole% of one or more of Ga, Ge, Sn, Sb, Ag, Cu, Pr, Ce, Nd, Sm, Eu, or Ho.

37. In a system for performing evanescent wave spectroscopy on a sample, the system including an optical fiber having a sample contacting portion, a source of infrared light for transmitting infrared light through the optical fiber, and a detector for receiving the infrared light transmitted through the fiber, the improvement comprising:

a plurality of chalcogenide glass nanowires on the sample contacting portion of the optical fiber.

38. A method for forming chalcogenide nanostructures comprising:

providing a chalcogenide vapor and a substrate;

depositing the chalcogenide vapor onto a preselected amorphous portion of a substrate to form nanostructures of the chalcogenide.

39. A method comprising:

providing microscale structures on an implant by subliming a material to provide a vapor phase and depositing the vapor phase onto a surface of the implant such that microscale structures of the vapor phase are formed on a preselected portion of the implant.

40. The method of claim 39 wherein the structures comprise nanowires.

41. The method of claim 40 wherein the nanowires comprise chalcogenide.

42. The method of claim 39 wherein the structures comprise chalcogenide.

43. The method of claim 42 wherein the chalcogenide comprises Se.

44. The method of claim 39 wherein the structures comprise micro-crystals.

45. The method of claim 44 wherien the micro-crystals comprise As_2O_3.